Stormwater Management in Healthcare 2016

Joan D. Plisko, PhD President 443-831-7981

joan@pliskosolutions.com







Plisko Sustainable Solutions (PSS) is a woman-owned small business, providing expertise in:

- Environmental health and policy,
- Sustainability programming, and
- Exposure assessment/industrial hygiene.

PSS develops and implements customized, strategic, and structured solutions.



Stormwater: A Resource; Not a Waste

Stormwater:

Rainwater and melted snow that runs off streets, lawns, parking lots, and other sites.

Pervious and Absorbed:

Filtered and ultimately replenishes aquifers or flows into streams and rivers.

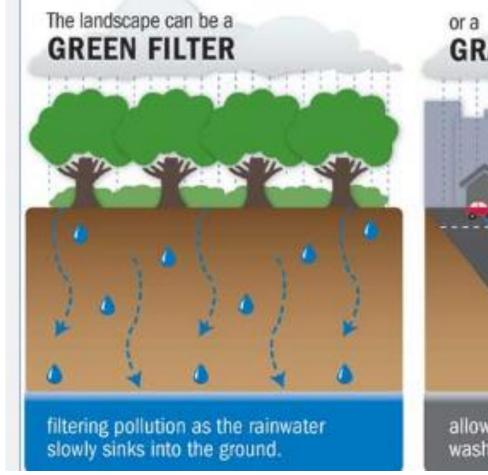
Impervious and Runs Off:

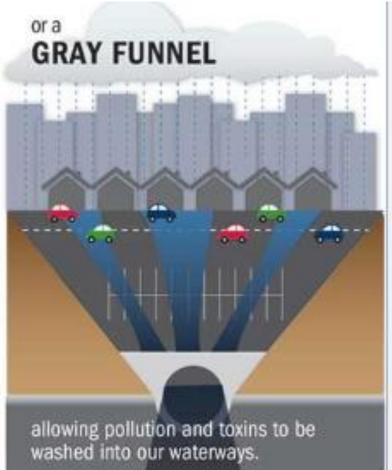
Areas such as pavement and roofs prevent precipitation from naturally soaking into the ground.



Pervious v. Impervious

Pervious and absorbed





Impervious and runs off



Stormwater Stew

As water flows off of streets, parking lots, and building rooftops it picks up:

- ✓ Fetilizers and pesticides from lawns and gardens
- ✓ Oil, grease, and toxics from motor vehicles
- ✓ Road salt
- ✓ Pet waste
- ✓ Other pollutants





Costs of Polluted Stormwater

Polluted water running into storm drains, sewer systems, and drainage ditches can cause:

- ✓ Contaminated rivers and streams ✓ Stream bank erosion
- ✓ Polluted drinking water
- ✓ Beach closures
- ✓ Fish advisories

- ✓ Downstream flooding
- ✓ Sewer overflows
- ✓ Infrastructure damage
- ✓ Habitat destruction





Health Effects of Polluted Stormwater*

Recreation/ Swimming

- Fecal coliform, bacteria and parasites may lead to:
- Viral infections
- Earaches
- Eye discharges
- Sinus problems
- Fever and flu
- Skin rashes
- Gastronintestinal problems

Drinking Water

- Acute illnesses can result from consuming water contaminated with protozoan oocysts, viruses, and bacteria
- Nitrates increase risk of methemoglobinemia, causing shortness of breath and blueness of the skin, especially for infants
- Water with elevated nitrate is suspected to increase miscarriage risk

Seafood Consumption

- Diarrheal and paralytic illnesses caused by the hepatitis A and Norwalk viruses, Vibrio species, and marine biotoxins formed by algal blooms
- Insecticides in fish raise concerns about carcinogenic effects and disruption of hormonal systems in humans

Ground Debris

- Trash and animal waste
- Disease-spreading bacteria, putting children and their families at risk in their local communities

Pooling of Stormwater

 Increased potential breeding areas for mosquitoes, the disease vectors for dengue hemorrhagic fever, West Nile virus, and other infectious diseases

^{*}Gaffield, S. J., Goo, R. L., Richards, L. A., & Jackson, R. J. (2003). Public Health Effects of Inadequately Managed Stormwater Runoff. *American Journal of Public Health*, 93(9), 1527–1533. //www.epa.gov/greeningepa/stormwater/



Evolution of Practice







- Wet ponds
- Infiltration and regional ponds
- Sediment basins

• Dry ponds

• Sediment i

1970's



- Pave it and pipe it
- Efficient conveyance, channelize flows



1990's

- Stormwater wetlands
- Filtering systems and bioretention
- Simple site planning
- Low impact development

2000's

- Alternative surfaces
- Buffers with protection
- Green roofs
- Limit clearing and grading



Slow it Down, Spread it Out, Soak it In!

- ✓ Bioretention cells
- ✓ Grassed swales
- ✓ Green parking design
- ✓ Infiltration trenches
- ✓ Inlet protection devices
- ✓ Permeable pavement and/or pavers
- ✓ Rain barrels

- ✓ Cisterns
- ✓ Riparian buffers
- ✓ Sand filters
- ✓ Soil amendments
- ✓ Stormwater planters
- ✓ Tree box filters
- ✓ Vegetated filter strips
- ✓ Vegetated roofs



Pervious Pavement







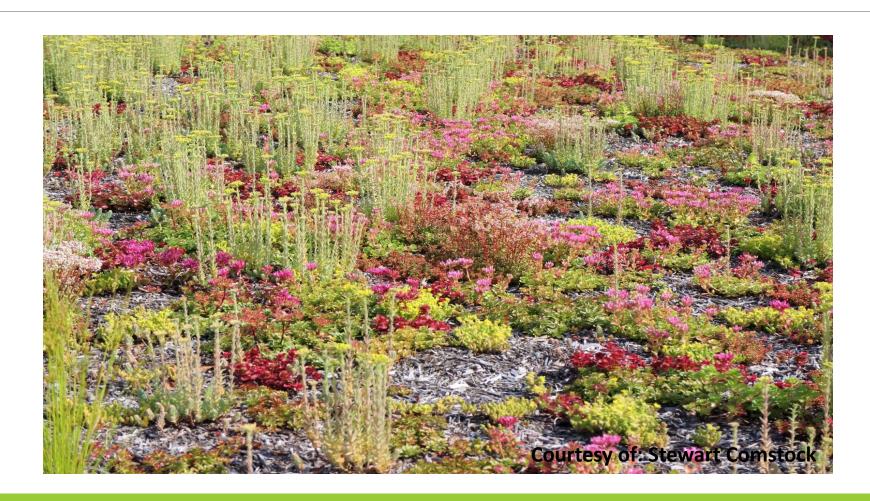
Adventist HealthCare Shady Grove Medical Green Roof



Barbara Truland Butz Healing Garden



Harford County Hospital Green Roof





Hagerstown Community College



Questions?

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